

REALISATION OF THE PROGRAMME CONTENTS IN P.E. TEACHING IN THE FIRST AND SECOND GRADE OF ELEMENTARY SCHOOL

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Abstract

This investigation of programme contents adoption was conducted on the sample of 160 first-grade tested pupils (82 schoolboys and 78 schoolgirls) and 153 second-grade tested pupils (74 schoolboys and 79 schoolgirls) of the elementary school. Morphological characteristics were estimated according to three variables (body height, body mass and body mass index). Motor abilities were estimated according to seven variables (bent-arm hang, standing long jump, medicine ball throwing, forward bend on a bench, 30-metre high sprinting run, 300-metre run and obstacle course backwards). The results were statistically evaluated and tabulated. The differences have been established through multivariant analyses of variance (MANOVA), univariant analyses of variance (ANOVA) and discriminative analysis. The results of the research showed that statistically there were no significant differences between the first and second grade schoolboys and schoolgirls when morphological characteristics were concerned, while in the area of motor abilities there were differences which are statistically significant.

Key words: pupils, morphology, motor abilities, MANOVA, discriminative analysis

Introduction

The causes of inefficiency of the P.E. tuition are ascribed to different factors (inefficient number of classes, inadequate program, bad conditions ...) but also to the insufficient engagement of the lower grades teachers entrusted with this PE classes implementation. In addition to that it is essential to add that the quality and efficiency of the P.E. classes in lower grades is an important precondition for the successful conduct of PE classes in senior grades. In this period the structure of motor space based on endogenous and exogenous factors is built and they affect the growth and development of children. The negative grades especially refer to the state of P.E. in the lower grades of the elementary school and the common observation is that the physical education on the level of lower grades is in the constant retrogression and for a long period has not shown any improvement. Neither democratic changes nor reforms of the school programme have given any results yet. We do not want to explore which of these factors and to what extent influences the efficiency of the PE teaching the main concern of this paper is going to be the efficiency of the implementation of PE curricula in the first grade and second grade of the elementary school.

Aim and hypotheses

Research topic encompasses morphological characteristics and motor abilities schoolboys and schoolgirls. Research aim is to determine the efficacy of the PE curricula realisation in the first and second grade of the elementary school. H₁ - there are no statistically significant differences in morphological characteristics and motor abilities when comparing the first grade schoolboys and schoolgirls.

H₂ - there are no statistically significant differences in morphological characteristics and motor abilities when comparing schoolboys and schoolgirls.

Methods

This research has applied transversal research model. Data gathering was performed by the experimental method, i.e. ex-post-facto experiment and data were processed by the statistical method.

Subject sample: Subject sample comprised 160 first-grade pupils (82 schoolboys and 78 schoolgirls) and 153 second-grade pupils (74 schoolboys and 79 schoolgirls) of the elementary schools of the Trstenik.

Sample of measuring instruments: For the morphological characteristics estimation following variables were applied: body height - AVIS, body mass - AMAS, body mass index - ABMI. Following tests were used for the investigation of motor abilities: bent-arm hang - MZGB, standing long jump - MSDM, medicine ball throwing - MBMD, forward bend on a bench - MDPB, 30-metre high sprinting run - MO30, 300-metre run - M300, obstacle course backwards - MPON.

Data processing: Besides basic statistical parameters differences between schoolboys and schoolgirls were calculated by multivariant and univariant analysis of variance and discriminative analysis. Profile of group homogeneity in areas was done and the obtained results are interpreted and displayed in tables. By applying chosen data processing methods the results were obtained which generated the information on the retention or rejection of the set hypotheses.

Results and discussion

The aim of this research is to determine the efficiency of PE curricula implementation in the first and second grade of the elementary school. This was done on the basis of the parameters of the growth and development of single morphological characteristics and motor abilities of PE curricula in the first and second grade schoolboys and schoolgirls of the elementary school.

Differences between schoolboys and schoolgirls in morphological characteristics

When considering basic parameters of the results of schoolboys and especially schoolgirls (Tables 1, 2, 3 and 4) we can notice numerical differences in the average results of the single variables. Significant difference is evident though not so high in body

height (AVIS). Schoolboys are a little bit higher than girls. When considering body mass (AMAS) schoolboys are somewhat more homogeneous by weight, while schoolgirls are heterogeneous, this being caused by minimal and maximum results.

It is normal to expect difference in results for a widely known fact that children come from different environments at the start of their schooling, with different level of growth and development, social and cultural habits. Many a research showed no statistically significant differences between schoolboys and schoolgirls in morphological area. Such a hypothesis was a starting point for this research. Regardless of the numerical differences in average result in single variables in favour of schoolboys or schoolgirls generally there are no statistically significant differences.

Table 1. *Central and dispersion parameters of the first grade schoolboys morphological characteristics*

N = 82	mean.vl.	std. Dev.	min	max	k.v.%	interv.	incr.	p
AVIS	1304.48	56.58	1205.00	1473.00	4.34	1292.04	1316.91	.92
AMAS	279.29	53.39	215.00	460.00	19.12	267.56	291.03	.18
ABMI	16.31	2.09	13.41	24.89	12.80	15.85	16.76	.14

Table 2. *Central and dispersion parameters of the first grade schoolgirls morphological characteristics*

N = 78	mean.vl.	std. Dev.	min	max	k.v.%	interv.	incr.	p
AVIS	1300.83	63.03	1165.00	1478.00	4.85	1286.62	1315.05	.94
AMAS	271.22	59.59	190.00	615.00	21.97	257.78	284.66	.13
ABMI	15.91	2.26	12.47	28.15	14.23	15.40	16.42	.48

Table 3. *Central and dispersion parameters of the second grade schoolboys morphological characteristics*

N = 74	mean.vl.	std. Dev.	min	max	k.v.%	interv.	incr.	p
AVIS	1349.51	59.39	1205.00	1490.00	4.40	1335.75	1363.28	1.00
AMAS	307.73	58.80	210.00	525.00	19.11	294.10	321.35	.82
ABMI	16.77	2.15	14.05	24.63	12.81	16.28	17.27	.37

Table 4. *Central and dispersion parameters of the second grade schoolgirls morphological characteristics*

N = 79	mean.vl.	std. Dev.	min	max	k.v.%	interv.	incr.	p
AVIS	1332.89	67.54	1177.00	1515.00	5.07	1317.75	1348.02	1.00
AMAS	290.32	54.98	205.00	420.00	18.94	278.00	302.63	1.00
ABMI	16.23	2.14	13.38	22.05	13.16	15.75	16.71	.66

Table 13. *Central and dispersion parameters of the first grade schoolboys motor abilities*

N = 82	std. val.	std.dev.	min.	max.	k.v.%	interv.incr.	p
MZGB	256,78	155,26	31,00	761,00	60,47	222,66 290,90	.76
MSDM	123,76	18,92	81,00	173,00	15,28	119,60 127,91	1.00
MBMD	265,01	56,66	141,00	390,00	21,38	252,56 277,46	1.00
MDPR	405,37	63,89	245,00	575,00	15,76	391,33 429,41	.96
MO30	61,37	5,49	52,00	78,00	8,95	60,16 62,57	.97
M300	84,40	11,24	65,00	117,00	13,32	81,93 86,87	.94
MPON	202,15	54,07	110,00	460,00	26,75	190,26 214,03	.58

Table 14. *Central and dispersion parameters of the first grade schoolgirls motor abilities*

N = 78	std.val.	std.dev.	min.	max.	k.v.%	interv.incr.	p
MZGB	206.49	147.57	20.00	736.00	71.47	173.21 239.77	.95
MSDM	114.22	18.18	56.00	157.00	15.92	110.12 118.32	1.00
MBMD	212.76	40.27	100.00	350.00	18.93	203.67 221.84	1.00
MDPR	406.54	57.82	255.00	540.00	14.22	393.50 419.58	.95
MO30	64.73	6.13	54.00	80.00	9.48	63.35 66.11	.98
M300	86.18	11.75	28.00	113.00	13.64	83.53 88.83	.74
MPON	238.42	71.54	137.00	572.00	30.00	222.29 254.56	.01

Table 15. Central and dispersion parameters of the second grade schoolboys motor abilities

N = 74	std. val.	std.dev.	min.	max.	k.v.%	interv.incr.	p
MZGB	332.55	213.36	10.00	922.00	64.16	283.11 382.00	.76
MSDM	132.68	17.40	84.00	173.00	13.11	128.64 136.71	.89
MBMD	310.97	53.37	180.00	450.00	17.16	298.60 323.34	.99
MDPR	377.43	47.91	280.00	535.00	12.69	366.33 388.53	.60
MO30	60.11	6.77	50.00	78.00	11.27	58.54 61.68	.49
M300	79.22	10.18	65.00	110.00	12.85	76.86 81.57	.27
MPON	167.00	39.59	110.00	250.00	23.70	157.83 176.17	.92

Table 16. Central and dispersion parameters of the second grade schoolgirls motor abilities

N = 78	std.val.	std.dev.	min.	max.	k.v.%	interv.incr.	p
MZGB	243.90	182.33	30.00	850.00	74.76	203.05 284.75	.38
MSDM	123.32	15.16	90.00	160.00	12.29	119.92 126.71	1.00
MBMD	258.56	42.45	180.00	400.00	16.42	249.05 268.07	.59
MDPR	422.03	56.29	320.00	540.00	13.34	409.41 434.64	1.00
MO30	64.00	0.17	52.00	78.00	14.32	61.95 66.05	.31
M300	83.47	12.17	63.00	117.00	14.58	80.74 86.19	.62
MPON	207.20	62.92	117.00	441.00	30.37	193.11 221.30	.18

Table 19. Univariate differences between the first grade schoolboys and schoolgirls in motor abilities

Variables	Mean values		t	p
	Schoolboys	Schoolgirls		
MZGB	256,78	206.49	2.09	.03
MSDM	123,76	114.22	3.24	.00
MBMD	265,01	212.76	6.69	.00
MDPR	405,37	406.54	0.21	.88
MO30	61,37	64.73	3.65	.00
M300	84,40	86.18	0.33	.72
MPON	202,15	238.42	3.60	.00

Table 20. Univariate differences between the second grade schoolboys and schoolgirls in motor abilities

Variables	Mean values		t	p
	Schoolboys	Schoolgirls		
MZGB	332.55	243.89	2.76	.00
MSDM	132.67	123.31	3.55	.00
MBMD	310.97	285.55	6.74	.00
MDPR	377.43	422.02	5.26	.00
MO30	60.10	64.00	3.00	.00
M300	79.21	83.46	2.33	.02
MPON	167.00	207.20	4.76	.00

Table 5. Multivariate differences between the first grade schoolboys and schoolgirls in morphological characteristics

N	F	p
3	0.90	.445

Table 6. Multivariate differences between the second grade schoolboys and schoolgirls in morphological characteristics

N	F	p
3	1.20	.310

Multivariate analysis (MANOVA), Table 5 and 6, shows no statistically significant differences between schoolboys and schoolgirls in morphological area. It is also determined that there are no statistically significant differences in single variables results between schoolboys and schoolgirls by means of univariate analysis of variance (ANOVA), Table 7 and 8.

Table 7. Univariate differences between the first grade schoolboys and schoolgirls in morphological characteristics

VARIABLE	F	p
AVIS	0.14	.70
AMAS	0.81	.37
ABMI	1.31	.25

Table 8. Univariate differences between the second grade schoolboys and schoolgirls in morphological characteristics

VARIABLE	F	p
AVIS	2.60	.10
AMAS	3.58	.05
ABMI	2.43	.11

It is to expect that the results of the discriminative analysis are congruent with the results of the multivariate analysis of variance (MANOVA) that is that there are no statistically significant differences between schoolboys and schoolgirls, Tables 9, 10.

Table 9. Significance of differences between the first grade schoolboys and schoolgirls in morphological characteristics on the basis of discriminative analysis

n	F	p
3	0.68	.450

Table 10. Significance of differences between the second grade schoolboys and schoolgirls in morphological characteristics on the basis of discriminative analysis

n	F	p
3	1.19	.311

Assessing group homogeneity results in morphological characteristics (Table 11), it can be seen that the first grade schoolboys and schoolgirls are very similar in their morphological characteristics. Out of 82 subjects 38 have the characteristics of their group, which makes 46%, and out of 78 female subjects 45 have the characteristics of their group which is over 57% and is considered moderate homogeneity. It is important to emphasise that the second grade schoolboys and schoolgirls are homogeneous enough (Table 12), so 62% of schoolgirls have the characteristics of their group, and in schoolboys that result is smaller (44%), but can be said to be homogenous in morphological characteristics.

Table 11. Homogeneity of the first grade schoolboys and schoolgirls in morphological characteristics

Group	n/m	%
schoolboys	38/82	46.341
schoolgirls	45/78	57.692

Table 12. Homogeneity of the second grade schoolboys and schoolgirls in morphological characteristics

Group	n/m	%
schoolboys	33/74	44.59
schoolgirls	49/79	62.02

Having in mind all previously mentioned we can conclude that schoolboys and schoolgirls do not differ significantly in morphological characteristics.

Differences between schoolboys and schoolgirls in motor abilities

Surveying Tables 13, 14, 15 and 16 showing basic statistical parameters of schoolboys and schoolgirls in motor abilities, it can be seen that their average results are numerically different in almost all variable in favour of schoolboys. Measures of dispersion point to great heterogeneity of results in both sexes. This is especially related to the test applied for the estimation of some aspects of strength (MZGB, MBMD) and tests for the estimation of coordination, i.e. reorganisation of movement (MPON).

In assessing the differences by the multivariate analysis of variance (MANOVA), it can be noticed that schoolboys and schoolgirls differ significantly in the system of applied motor tests (Table 17 and 18). Thus there is high level of certainty for the claim that schoolboys and schoolgirls differ in motor abilities. Similar phenomena were pointed at in previous research although it is believed that these differences were obtained by chance.

Table 17. Multivariate differences between the first grade schoolboys and schoolgirls in motor abilities

n	F	p
7	8.04	.000

Table 18. Multivariate differences between the second grade schoolboys and schoolgirls in motor abilities

n	F	p
7	14.58	.000

The obtained difference between the first grade schoolboys and schoolgirls is due to the results in single variables starting with the variable for the estimation of the hand and shoulder strength (MZGB), variable for the estimation of explosive leg strength (MSDM), medicine ball throwing (MBMD), variable for the estimation of speed (MO30) and the variable for the estimation of reorganisation of movement (MPON) (Table 19.), obtained by the univariate analysis of variance. All significant differences are in favour of schoolboys. Results of motor abilities tests show that there are statistically significant differences between the second grade schoolboys and schoolgirls in all applied variables (Table 20.). As seen when testing mean values in all parameters schoolboys have better results on average than schoolgirls. To show that schoolboys and schoolgirls really differ in motor abilities discriminative analysis was used and the results are shown in Table 21 and 22.

Table 21. Significance of differences between the first grade schoolboys and schoolgirls in motor abilities on the basis of discriminative analysis

n	F	p
7	8.01	.000

Table 22. Significance of differences between the second grade schoolboys and schoolgirls in motor abilities on the basis of discriminative analysis

n	F	p
7	14.43	.000

Knowing that p is = .000 it can be concluded that it is possible to draw a clear line between schoolboys and schoolgirls in motor area. Assessing group homogeneity results in motor abilities (Table 23), it can be seen that the first grade schoolboys and schoolgirls are very similar in their motor abilities.

So 74% of schoolboys have the characteristics of their group, and in schoolgirls that result is smaller (73%), but can be said to be homogenous in motor abilities. It is important to emphasise that the second grade schoolboys and schoolgirls are very homogeneous in motor abilities (Table 24), so out of 74 subjects 58 have the characteristics of their group, which makes 78%, and out of 79 female subjects 65 have the characteristics of their group which is over 82%.

Table 23. *Homogeneity of the first grade schoolboys and schoolgirls in motor abilities*

GROUPS	n/m	%
Schoolboys	61/82	74.39
Schoolgirls	57/78	73.07

Table 24. *Homogeneity of the second grade schoolboys and schoolgirls in motor abilities*

GROUPS	n/m	%
Schoolboys	58/74	78.37
Schoolgirls	65/79	82.27

Previous analyses have evidently shown that schoolboys and schoolgirls significantly differ in the system of motor variables. Differences are in favour of schoolboys.

Conclusion

Based on the results and their analysis following conclusion can be reached: 1. In the system of applied variables in morphological area results show that there are numerical differences between the first grade schoolboys and schoolgirls and the second grade schoolboys and schoolgirls caused mainly by the individual differences. Mean values and values of Kolmogorov-Smirnov test show that results in schoolboys and schoolgirls are in the range of expected values and with schoolattending comes some stagnation in growth and development due to change in movement regime, way of living and work, nutrition and that this sample follows the value of natural increment. Most homogeneity in schoolboys and schoolgirls was expressed in body height (AVIS), then in body mass index (ABMI) and the least in body mass (AMAS). Analyses of the results of morphological characteristics have shown that between the schoolgirls and schoolboys there is no statistically significant difference in the system of applied variables between schoolboys and schoolgirls. Schoolboys and schoolgirls show moderate homogeneity in morphological characteristics; 2. Results of motor abilities tests show that there are numerical differences between the first grade schoolboys and schoolgirls and the

second grade schoolboys and schoolgirls in all applied variables. Most heterogeneous results were obtained in bent-arm hang (MZGB) and medicine ball throwing (MBMD) and coordination (MPON), in both sexes. Despite great heterogeneity of the results mean values and Kolmogorov-Smirnov tests show that there is no significant aberration. Relatively poor results in tests for the estimation of strength and coordination show that there was no incentive to keep the same position as long as possible and due to the weak muscle system engaged in testing. Poor results confirm the fact that no sufficient time is allotted to the shaping exercises and the teaching units devoted to strengthen the muscle system of the legs and shoulder. In the system of applied variables in motor area it was determined that schoolboys and schoolgirls differ statistically significantly ($p = .000$). Between the first grade schoolboys and schoolgirls there are no statistically significant differences in forward bend on a bench (MDPR) and 300-metre run (M300). In all other tests there is statistically significant difference in favour of schoolboys. Schoolboys and schoolgirls have high homogeneity in motor abilities. Obtained results of morphological characteristics and motor abilities of the first grade schoolboys and schoolgirls and of the second grade schoolboys and schoolgirls are in the range of expected values which is congruent with the previous research (Krsmanović, 1985; Kozarov, 1985; Ivanić, 1996; Babin et al., 1999; Đurašković, 2002; Kragujević and Rakić, 2004; Zrnzević, 2003 and 2007 and Ivanović, 2005). Thus hypothesis H_1 that: between the first grade schoolboys and schoolgirls there are no statistically significant differences in morphological characteristics and motor abilities and H_2 : between the second grade schoolboys and schoolgirls there are no statistically significant differences in morphological characteristics and motor abilities – can be partially substantiated. This means that between the first grade schoolboys and schoolgirls and between the second grade schoolboys and schoolgirls there are no statistically significant differences in morphological characteristics, but in motor abilities difference exists and is statistically significant. In the end we can conclude that motor abilities of the first and second grade schoolboys and schoolgirls of elementary school do not suffice. Therefore it is vital that all and especially lower grades teachers thoroughly realise PE curricula contents and constantly monitor the growth and development of the schoolchildren, increase the intensity of exercising and the pupils motivation because this is the only path to an adequate growth and development.

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REALIZACIJA PROGRAMSKIH SADRŽAJA U NASTAVI TJELESNOG ODGOJA U PRVOM I DRUGOM RAZREDU OSNOVNE ŠKOLE

Sažetak

Istraživanje usvojenosti programskih sadržaja sprovedeno je na uzorku od 160 ispitanika (82 učenika i 78 učenica) prvog razreda i 153 ispitanika (74 učenika i 79 učenica) drugog razreda osnovne škole. Morfološke karakteristike procijenjivane su pomoću tri varijable (visina tijela, masa tijela i indeks tjelesne uhranjenosti). Motoričke sposobnosti procijenjivane su pomoću sedam varijabli (vis u zgibu, skok u dalj s mesta, bacanje medicine, duboki pretklon na klupi, trčanje na 30 metara iz visokog starta, trčanje na 300 metara i poligon natraške). Dobiveni rezultati statistički su obrađeni i tabelarno prikazani. Razlike su utvrđene uz pomoć multivarijantne analize varijance (MANOVA), univarijantne analize varijance (ANOVA) i diskriminativne analize. Rezultati istraživanja pokazali su da između učenika i učenica prvog i drugog razreda ne postoje statistički značajne razlike u prostoru morfoloških karakteristika, ali u prostoru motoričkih sposobnosti razlike postoje i one su statistički značajne.

Ključne riječi: učenici, morfolologija, motoričke sposobnosti, MANOVA, diskriminativna analiza
